Honors Chemistry: Rules for Significant Figures (sig figs, s.f.)

A. Read from the left and start counting sig figs when you encounter the first non-zero digit

1. All non-zero numbers are significant (meaning they count as sig figs)
    613 has three sig figs
    123456 has six sig figs

2. Zeros located between non-zero digits are significant (they count as sig figs)
    5004 has four sig figs
    602 has three sig figs
    6000000000000002 has 16 sig figs!

3. Trailing zeros (those at the end) are significant only if the number contains a decimal point; otherwise they are *insignificant* (they do not count)
    5.640 has four sig figs
    120000. has six sig figs
    120000 has two sig figs – unless you're given additional information in the problem

4. Zeros to left of the first nonzero digit are insignificant (they don't count); they are only placeholders!
    0.000456 has three sig figs
    0.052 has two sig figs
    0.00000000000000000000000000000000000052 also has two sig figs!

B. Rules for addition/subtraction problems

Your calculated value cannot be more precise than the least precise quantity used in the calculation. The least precise quantity has the fewest digits to the right of the decimal point. **Your calculated value will have the same number of digits to the right of the decimal point as that of the least precise quantity.**

In practice, find the quantity with the fewest digits to the right of the decimal point. In the example below, this would be 11.1 (this is the least precise quantity).

7.939 + 6.26 + 11.1 = 25.299 (calculator answer)

In this case, your final answer is limited to one sig fig to the right of the decimal or 25.3 (rounded up).

C. Rules for multiplication/division problems

The number of sig figs in the final calculated value will be the same as that of the quantity with the fewest number of sig figs used in the calculation.

In practice, find the quantity with the fewest number of sig figs. In the example below, the quantity with the fewest number of sig figs is 27.2 (three sig figs). Your final answer is therefore limited to three sig figs.

(27.2 x 15.63) ÷1.846 = 230.3011918 (calculator answer)

In this case, since your final answer it limited to three sig figs, the answer is 230. (rounded down)

D. Rules for combined addition/subtraction and multiplication/division problems

First apply the rules for addition/subtraction (determine the number of sig figs for that step), then apply the rules for multiplication/division.